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## THE TEACHER'S INVOLUNTARY INFLUENCE ON THE MORAL CHARACTER OF HIS PUPILS.

THE whole mind should be cultivated constantaneously, for there is not an element or capacity that is not necessary to the mature and perfect action of the mind. The whole system of instruction in our schools, and all our text-books, address almost solely the intellect of the child, and seek its development alone. The corresponding growth of the social and moral affections must depend almost entirely upon the personal labors of the teachers, where the work is not attended to at the parental fireside. The founders of our common school system felt the importance of securing homogenous growth of the mind; and because the education of the heart is most exacting to the teacher, and most liable to be overlooked—and most rarely made a matter of enquiry and examination by the school committees, they provided for its healthful cultivation by a specific and emphatic statute.\* With all this, it is the painful admission of our times that our youth grow up with disproportionate and unbalanced intellectual developments; and that the heart, with all its human and divine aspirations and affections, is left to a large degree untrained. The great idea that our schools are to be *Christian* schools, seems to be overlooked in a nervous fear of trenching upon our overgrown sectarianism, and under the pressure of the prevailing worldliness of our times. Our schools have come to be not only not sectarian or religious, but many of them, even in the broadest sense, are not Christian. Save the formal reading of the Scriptures, there is scarcely anything in the daily routine of duties to distinguish one of our schools from a Mohammedan school, save that in the latter there would be

\* "It shall be the duty," is the simple and sublime utterance of the Massachusetts law, "of all preceptors and teachers of Academies, and all other instructors of youth, to exert their best endeavors to impress on the minds of children and youth, committed to their care and instruction, the principles of piety, justice, and a sacred regard to truth, love to their country, humanity and universal benevolence, sobriety, industry, and frugality, chastity, moderation and temperance, and those other virtues which are the ornaments of human society, and the basis upon which a republican constitution is founded."

a distinct and continued recognition of the claims of the Koran, and of the authority of Mahomet. What we mean by a Christian school is, that all its studies and discipline should proceed upon Christian principles: that not motives of worldly policy and merely human emulation should be the chief inspirations of our childhood, but the sublime, unchangeable claims of duty and of God; that there should be a continued recognition of the great and noble purposes of education suggested in our Christian system, and that our youth should be urged to diligence, because God has bestowed upon them powers and opportunities, for the improvement of which he will hold them accountable; and in order that they may be better able to accomplish great and noble acts of usefulness among their fellows when their powers are fully matured. And discipline, instead of being the exhibition of legitimate or arbitrary authority, should be ennobled and sanctioned by higher principles. The child should be impressed with the necessity of obedience and fidelity, not because the lack of these, if discovered, will bring a punishment upon him, but because it is his duty to yield them: there is an Omniscient Eye marking his conduct; and conscience will sit in judgment upon all his acts.

Manifestly, we ought not, with the tender and credulous spirits of childhood for the subjects of our labors, to allow youth to step forth into their maturity uncertain in the grounds and principles of their Christianity. They should be made from the first to feel that they are in a Christian school, and whatever else they fail of obtaining, when they leave its walls they should go forth Christian youth.

A fearful responsibility must rest upon the teacher should there be a failure here. If in the susceptible hours passed within the precincts of his educational sanctuary, these virtuous principles, this faith in the Christian religion in its broadest sense is not inculcated and enforced, what assurance can the teacher have that all his accumulated intellectual strength will not be so much more power for evil in the earth, working out the ruin of the youth, and drawing others down with him in his course. Our democratic institutions, our popular general government, the purity of our moral atmosphere, all the beautiful holy places that our fathers have consecrated, and the holy days on which they have worshiped, can be saved from desecration and destruction only by the right development and culture of the moral sense of each coming generation of our children. Let us hear what our model master, Arnold, says on this point: "The idea of a Christian school," says his biographer, "was to him the natural result, so to speak, of the very idea of a school in itself. The intellectual training was not, for a moment, underrated, and the machinery of the school was left to have its own way. But he looked upon the whole as bearing on the advancement of the one end of all instruction and education; the boys were still treated as school-boys, but as school-boys who must grow up to be Chris-

tian men, whose age did not prevent their faults from being sins, or their excellences from being noble and Christian virtues, whose situation did not of itself make the application of Christian principles to their daily lives an impracticable vision." Now, the idea we seek to embody is this, that the teacher should keep before his own mind the sublime religious ends of education, the great purposes of life, and that his whole manner and character should be so influenced by these convictions, as powerfully and continually to impress the young. Let their education be conducted, not purposelessly and without a plan. Let the teacher be to them not a jailor or a task-master, but a father and a friend, fitting them for useful and exalted labors hereafter, and inspiring their ardent affections with his own fervent spirit, and with high moral motives. I do not forget the material upon which he is to operate ; but however degraded in some instances, and ignorant and vicious, it is still *mind*, and it must be developed ; and it may be ennobled and purified by contact with ennobling and hallowing truth.

We can conceive of the influence upon our social life, if adequate attention were paid to the development and discipline of the social and moral affections, and if in these determining hours, sound moral principles were carefully laid down deep in the hearts of the young. We have the childhood of our whole population, by law, in our schools, and we cannot see why the grand idea of an intellectual, moral and religious culture and education, proceeding simultaneously and harmoniously, might not be realized in our common schools.

We would not be misunderstood here. We do not ask for any denominational biasses, for any commentaries upon the Bible, for the inculcations of any religious forms. We ask only for the inculcation of simple faith in what we all receive, in God, in the Bible, in our immortality and responsibility. We ask that we shall have graduated from our schools, not civilized Pagans, or Mohammedans, or sceptics, but Christian children. The teacher should be seized with this idea : it should become a part of himself. The result to be obtained is not to be reached by occasional addresses and solemn phrases : it is to be the work of his life ; the inclination of all his efforts, the tendency of all the studies of his school should be to secure a Christian education. The most powerful impression he is to make upon these sensitive spirits is that he is a Christian man, under the government of Christian principles, than to swerve from which a loss of place or life were rather to be preferred. What a grand and awakening element may this become in the school-room !

And all this without remuneration ? Yes, this crowning grace of a teacher's acquisitions is not even the subject of examination when he enters upon his duties, and however faithfully performed, will not add a farthing to his annual income. It would be a fearful thing if it did. It would be placing a price upon virtue, and offering a reward for hypocrisy. But such

an earnest life will not be without its compensations ; truth and righteousness carry with them their own peculiar remunerations. Beyond the inward blessings, positive in their relation to a faithful performance of duty, there is another recompense. The true artist works long and painfully in his dimly lighted room, denying himself a thousand social pleasures, and making his marks slowly, and often with a wearied arm. His reward comes late, and then not in the form of gold, yet not the less to be coveted on this account. As his earthly career draws to a close, the light of his sun begins to send forth its radiance upon the earth. In the galleries of the arts, where the works of the worthy few are enshrined for preservation, and in the high places of the earth, he marks with a flashing eye, even as its mortal light is quenched, the children of his imagination. He will not altogether die ; the world has become his executor, and his labors will be the permanent estate of all our generations, entailed upon them for all time.

How much higher must be the gratification of the designer and engraver in human character, when his handiwork stands the test of time, and of a world-wide scrutiny. What a picture gallery, in the sanctuary of memory, will be the forms of those who received their inspirations and discipline in his presence, who have solved the great problem of their own lives, and are gladdening the world with the stores of their knowledge and virtue and charity. But this is not all ; such artists, like Appelles, paint for eternity. The full force of a painting may fail of being brought out through the badness of the light, or the unfavorableness of the position in which it is exposed. It cannot yet appear what manner of persons these shall be, in the higher life ; the light is too weak, and the position is not the most favorable, but in the beams of "the excellent glory," and in the high places of our immortality, the full measure and results of the teacher's toil will appear, and his reward shall be the sublime approval of the Father of all—"Well done, good and faithful servant."

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**Pets.**—As developing the gentler side of our nature, the rearing of pets is to be encouraged in the young. The purest and sweetest satisfactions grow out of sentiments of pity, tenderness, and love, and such tend to form the noblest and most truly great character. Though not so obtrusive as stronger and more antagonistic qualities, they have a persuasiveness and ultimate rule which insures the most lasting conquest. "The meek shall inherit the earth." In the hearts of children, therefore, let us seek to nurture all those kindly feelings of which they will have full need to withstand the harshness that the rough dealing of the world begets. The child's play with its kitten may be the seed of ripe fruits of tenderness and sympathy which shall be precious to sorrowing men. Human loneliness is abnormal, and cannot exist without a measure of friendly relations.



## FACTS AND THOUGHTS ABOUT REFORM SCHOOLS.

## VI.—A VISIT TO THE PHILADELPHIA HOUSE OF REFUGE.

HAVING so far led our readers through a labyrinth of historical and statistical fragments, let us invite them to accompany us on a visit to one of these Houses of Refuge. Passing up Coates Street, under the frowning walls of the Eastern Penitentiary, we are relieved on turning northward to catch glimpses of green fields, white-railed enclosures and a turf-encircled reservoir. The fields belong to Girard College, the neat grounds to the Northern Home for friendless children. Between the two stands the Philadelphia House of Refuge, its buildings looking down cheerfully upon us, in spite of the high walls. Passing up the southern side under the grateful shade of vigorous young trees, we arrive at the entrance and are admitted on presenting to the janitor the ticket furnished by a manager. Once inside the wall a scene of beauty breaks suddenly upon us. The buildings are covered with the quick-growing American ivy, its masses clinging and climbing everywhere. The grounds, tastefully laid out, have a profusion of trees, shrubs and flowers on every hand. A brick walk leads to the front entrance, where the janitor delivers us to a teacher, whom we follow down a long, and neatly-carpeted hall. First to the work-shops: One devoted to the manufacture of chairs is entered. We look curiously at the young workmen, but see little difference between them and other boys. The next is used for the manufacture of shoes; the next, boxes for matches, and here some of the smallest boys are employed. How the little fingers fly! Each one is anxious to be noticed as the fastest workman, and all add sundry little nervous twitches to the necessary motions, giving the idea of great rapidity of execution. In the next shop they are making brushes of all kinds, and it is curious to watch the process of drawing in the bristles by those small hands. There is a blacksmith shop for the older boys, from which the sounds of brisk industry ring out an "anvil chorus." We are shown the pool for bathing, and see at once that no excuse for uncleanness can avail. We visit the school-rooms, the dormitories, the chapel, and the dining-room. Then our conductor passes us through a door, and we stand at the head of another hall similar to the one just traversed. We are now on the girls' side of the house, and a lady advances to be our guide through it. A large, airy, cheerful sewing-room is first entered; opening on three sides, by large windows, into a beautiful flower-garden. Here the girls sit in the mornings, at work upon garments for themselves and the boys. Here they gather in the evenings to read, converse and sing. The dining-room is opposite.

The plates are set for the evening meal, upon the bare, white tables. Everything is neat, bright and in order. Visiting the dormitories, we are struck with the display of pictures in every sleeping room. Each girl

sleeps alone, and the doors are locked during the night. There is far more of decoration and luxury here than in the boys' rooms, and we see how each child has exercised her housekeeping faculties, in arranging her small store. All the individual property she possesses is gathered here, and disposed to the best advantage. There are four corridors, as on the boys' side, one above the other, mounted by iron stairs and protected by iron railings. One can read the different characters in the modes of display adopted for the trinkets and pictures which strive to make the little bed-rooms gay and cheerful. We go to the wash-room where the clean windows, the neatly scoured tubs on both sides, and the spotless floor, make an agreeable impression; then to the kitchen, large, convenient, and looking as if nothing had ever disturbed its great shining range and white floor with even a hint of cookery or grease-spots. We hear a hum of voices up the broad stair-case, and looking that way, are told that the girls are in school and are not to be seen by visitors. We look so imploringly that the guide relents and lets us peep into the school-room. It is a model of a school-room, just over the sewing-room, of the same size, and like it overlooking the garden. We see only the backs of the girls, but just then they break out into their closing song. Sweet girlish voices, untaught it is true, and often discordant, but they are fresh and natural. We thank God that they are here, and move away with tears in our eyes.

And so we have seen "The Refuge." We pass again through the dividing door, and are in the hall leading to the front entrance. Reaching the lodge, we turn to take a parting look at the verdure and brightness within. An old woman in faded shawl, old-fashioned bonnet and limp skirts, is coming slowly down the walk from the house. She carries a little basket, and has been to see her grandson, taking him a morsel from the scanty home store. He has been idle, disobedient and vicious, but he is her own, and he has just told her that he will come out from here to be a help and comfort to her, and she believes him. Her heart is too full for silence, and she tells us all about him, and her hopes for the future, while we pray that they may not be disappointed. Just within the outer door she sees the box for contributions. The trembling old hands bring out a single penny from her pocket and eagerly deposit it, while we think of the "widow's mite," and how, in the final day, she may stand beside the donor of a hundred thousand dollars, with the commendation, "she hath done what she could."

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"If," said Faraday once to a young lecturer, "I said to my audience, This stone will fall to the ground if I open my hand, I should not be content with saying the words: I should open my hand and let it fall. Take nothing for granted as known. Inform the eye at the same time that you address the ear." This was the great secret of Faraday's success.

## THE SOCIAL ISOLATION OF FEMALE TEACHERS.

IN the first of her lectures on Woman's relation to Education, Labor and Law\*, Mrs. Dall tells a story which will find a parallel in the experience of not a few of our readers. Its truthful portrayal of the consequences of inadequate compensation in the case of one teacher, who not unfairly represents her sisterhood, is more affecting than the most elaborate argument. We would commend it to the consideration of those whose duty it is to determine the rates of teachers' wages; and especially to those who count themselves liberal if they allow a lady teacher half as much pay as would be given a man for doing the very same work.

The story contrasts the character and social standing of the principals of two high schools of a New England town,—one a gentleman, the other a lady:—She was an orphan, with a young sister dependent upon her for instruction and support. She had been graduated at one of the State Normal Schools. She was delicate and beautiful; not in the least 'strong minded.' Neither spectacles upon her nose, nor wooden soles to her boots, appealed to the popular indignation. All who knew her loved her; and the man whom we have named was not ashamed to receive instruction from her in geometry and algebra. The two schools were equal in numbers. The man was a bachelor, subject to no claim beyond his own necessity. What did common sense and right reason demand but that these two persons should be treated alike by society, prudential committees, and so on? You shall hear what was the fact. The man was engaged at a salary of fifteen hundred dollars. The wealthiest class in the community intrusted its sons to his charge without question. Single, he was made much of in society, invited to parties, and had his own corner at many a tea-table, which he brightened by his pleasant jokes. He soon came to be a person in town—had his vote, was valued accordingly; went to church, was put upon committees, had a great deal to do with calling the new minister, and so, out of school, he had pleasant and varied occupation, which saved his soul from racking to death in the ruts of Latin grammar. Would we have it otherwise? Was it not all right? Certainly it was, and our friend deserved it; deserved, too, that when the second year was half over, and there were rumors that a distant city had secured his services, the committee should raise his salary two hundred and fifty dollars and so keep him for themselves. But let us look at the reverse of this picture. The woman burdened with the care of a younger sister, greatly this man's superior in mathematics and possibly in other things, was engaged at six hundred dollars. It was not customary for the wealthy families in that neighborhood to trust their girls to the tender mercies of a public school; so she had a class of pupils less elegant in

\* THE COLLEGE, THE MARKET, AND THE COURT. By Caroline H. Dall. Boston: Lee & Sheppard. 8vo.

manner, of more ordinary mental training, and every way more difficult to control. Still they were disciplined, and learned to love their teacher. A few of the parents called upon her, and she was occasionally invited to their homes. But these homes were not congenial to her tastes or habits. There was no intellectual stimulus derived from them to brighten her life. They offered neither pictures statues, books, nor the results of travel, to her delicate and yearning appreciation. She talked for the most part of her pupils and their work ; and the strain of her vocation, always heavier on woman than on man, wore more and more upon her soul. Society, as such, offered her no welcome. She was nothing to the town. She hired her seat and went to church. She had no vote, was never on the parish committee, had only one chance to change her position. That was to remove to a more congenial neighborhood, at a lower salary ; but she thought of her young sister, and refused. If the committee heard of it, they did not offer to increase her salary. They were men incapable of appreciating her rare and modest culture. There was a tendency to consumption in her frame. Had she been happy, she might have resisted it for years, perhaps for ever ; but with the restless pining at her heart, that mental and moral marasmus, the physical disease soon showed itself. In the commencement of the third year of her teaching she began to cough, and in less than three months from the day when she heard her last class, she lay in an early but not unhonored grave.

It is no new story. You have heard it many times. Do not reply in the stale maxims of political economy. Do not say that woman's wages are cheaper than man's, because it is more abundant. Unskilled labor, we will grant you, is more abundant ; but such labor as here offered, must always be rare and valuable. To the applicants who came to fill her vacant place, the committee said, "We do not expect to find another capable as she was ; we have only to select one that *will do*." Yet they had not been ashamed to use that capacity without paying for it ! Only ignorance, and prejudice, and custom stood in the way of its appreciation ; only the want of that respect which a citizen can always command was at the bottom of her social isolation. She never complained ; but we complain for her, sadly conscious that until men themselves see what is fit, the remonstrances of women will be fruitless.

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EDUCATION does not commence with the alphabet. It begins with a mother's look—with a father's smile of approbation, or sign of reproof—with a sister's gentle pressure of the hand, or a brother's noble act of forbearance—with birds' nests admired and not touched, with creeping ants, with humming bees, with pleasant walks and shady lanes, and with thoughts directed in sweet and kindly tones and words to mature to acts of benevolence, to deeds of virtue, and to the source of all good—to God himself.

PALAFITTES, OR LACUSTRIAN HABITATIONS OF THE  
LAKE OF NEUCHÂTEL.

## III.—THE AGE OF IRON.

ALTHOUGH articles of iron are of frequent occurrence in many localities about lake Neuchâtel, there is but one station belonging exclusively to the iron age. This from the shallowness of the water is termed the *Tene*.

Between the *Maison Rouge* and the *Hospice de Prefargier* the lake shore is very flat, and consists principally of a fine turfy deposit, extending underneath the peat mosses near by. The action of the water undermines the latter and causes land slips, giving the surface the appearance of rough jagged rocks. Here and there on this floor of the *Tene* are groups of piles, usually sharpened, rising from ten to thirty centimetres from the bottom, but reaching the surface only at very low water. These are from ten to twenty centimetres in diameter, and are very soft; in some cases they are entirely decayed. They are frequently hewn square and occasionally are found jointed or connected, showing that they are the remains of ancient enclosures.

As in the previous ages, the antiquities occur in greatest quantities in the immediate neighborhood of the piles. Some lie upon the surface of the bottom, but the majority are to be found only by digging in the ooze to the depth of three or four feet. Being protected from contact with air and possibly preserved by the antiseptic properties of the peaty stratum, objects of iron thus buried are less injured than those on the surface. Wherever piles occur antiquities occur, so that the *Tene* must have been of very considerable extent. The greater part of the objects already collected have been obtained from only a small space at several points, in all not much more than an acre. In order of frequency they are found as follows: arms, utensils and vessels, garments, coins and skeletons.

Among the arms the lance-heads are most prominent. These are sometimes nine or ten inches long and two or three inches wide. They are elaborately worked, with a central prominence on each face. The wings are not always symmetrical. Some have serrated edges or are open-worked, rendering them formidable weapons. The staff was slender and often tipped with iron. These arms were evidently intended for thrusting, not for throwing. The sword blades are from twenty to twenty-five inches long, scarcely one inch thick, and have two edges. There is no guard, and only the tongue of the hilt remains. Some swords are found in their sheaths. These are straight, two-edged and marked by undulating lines, resembling in this respect damasked blades. The vast quantities found together have led to the belief that this palafitte was merely a storehouse. The sheaths are of wrought iron, in two sheets, and furnished at the top

with a rim for suspension. They are usually adorned by very remarkable designs. Some are engraved with the oscillating burin, others are made with a punch, while some sheaths are granulated like shagreen, resembling the surfaces obtained by etching with acids. Considerable numbers of iron javelins are found. These are of rude workmanship, and usually show only a socket pierced to receive a nail fastening the javelin to a staff. They could be used only as a missile thrown by the thong called *amentum*. The rudeness of finish shows that they were not regarded as valuable, and that the loss of a number of them was looked upon as a matter of little moment. The Roman javelin, iron armors and short pointed swords, so common in French stations of this age, are not found in the *Tene*.

Iron utensils are not very numerous. Boat hooks are most frequent. Sickles resembling those of our day are not rare. Two scythes have been found. They have a collar and a curved heel, showing that they were adapted to long handles and were used for mowing grass; a fact which proves that their owners required hay and therefore possessed cattle. The axe is larger than that of the bronze age, and differs otherwise. The edge is wider, and the handle is adapted to a socket formed by the junction of two wings. Bridle bits sometimes occur. Some horseshoes, very slender and cut for nails, have been obtained from the *Tene*. There, also, M. Schwab is said to have found a pot or saucepan, but some doubt is entertained respecting its authenticity. Knives are not uncommon, but they lack the elegance of those of the bronze age. M. Schwab has in his collection a pair of scissors, and M. Desor possesses a stewpan which gives ample evidence of numerous repairs.

In this age even the ornaments were principally of iron. Clasps of buckles are found in large quantities. A great number of rings of every size and form have been obtained. Some bronze articles occur, but they are unimportant. There is evidence that in the age of iron the precious metals were known, for traces of them appear in the *palafittes* and much has been obtained from tombs. Fragments of colored glass occur quite frequently at *Tene*, but more plentifully in some French stations, where necklaces are found in which glass beads alternate with beads of amber. The first lacustrine money was discovered in 1864. These pieces, five in number, are genuine Gallic coins and are all of the same design, bearing on the obverse the effigy of a man in profile, and on the reverse the image of a horned horse or, as some think, of a bull or he-goat. They bear no motto, are of bronze and appear to have been cast in moulds. Some gold coins, evidently of Greek origin, have been found and several true Roman pieces, an *as*, a *Tiberius* and a *Claudius*, have been obtained from the *Tene*. It is evident therefore that this *palafitte* existed until the beginning of our era.

Pottery is of frequent occurrence. Some specimens, black and half-



baked, differ little from those of the preceding period, but others are well baked and well made on the wheel. Roman tiles are exceedingly numerous. Other specimens elegant in workmanship have been found, but their date is doubtful. The appearance of baked pottery is additional proof that the palafittes of this age existed until and after the Roman invasion. The Helvetians and Gauls were ignorant of the use of mortar, and were consequently unable to construct kilns. The Romans introduced the art of baking earthenware, so that all baked pottery dates later than their invasions.

Among animal skeletons, those of the horse are most numerous. On the whole, animal remains are less abundant than in palafittes of the bronze age, and those which have been found have not yet been made the objects of special study. It is but recently that we have been successful in procuring the first human relics. They are the bones of the trunk, of the members, and, what is more important, a skull almost complete. In size this skull is quite large, but of a conformation far from advantageous, very long, flattened on top, with an enormous occipital development, while the forehead is so low as to appear almost absent. In this respect it is not superior to the skulls of the two previous ages, if it be not even inferior to them. No skull, so unfavorably formed, is to be found in the work of Messrs. Rutimeier & His. It pertains, however, to the group of Helvetian skulls, and is of the so-called type of Sion, to which it most nearly approximates. The bones of the members, especially those of the thigh and hip, of which we possess a number, have been the subject of detailed study by Dr. Guillaume; they indicate a race of men whose stature attained 1.9 m., and who were consequently of more than average height. The teeth, which are all preserved, present a rather singular peculiarity, inasmuch as not only the incisors, but even the canines, are greatly worn, as if they too had served for mastication.

The age of iron as seen in Lake Neuchatel is characterized thus: 1. The appearance of iron and its general use for arms, utensils and even objects of apparel. 2. The application of peculiar processes in the manufacture of swords similar to Damascus blades. 3. A peculiar system of ornamentation. 4. The appearance of coins with an effigy. 5. The use of iron clasps with spiral springs. 6. Wrought bronze introduced into general use.

Respecting the relative duration of the several ages little can be positively asserted, and as little is known concerning the races of men peculiar to each period. The only certain information we possess respects the age of iron. The implements, the coins and the skull all prove its Helvetian character. It is the bond between the earlier ages and the commencement of history. The previous races were smaller in size and in the bronze age more highly cultivated.

## CHEMISTRY OF THE PRIMEVAL EARTH.

## II.

WE next enter into the second phase in the action of the atmosphere upon the earth's crust. This, unlike the first, which was sub-aqueous, or operative only on the portion covered with the precipitated water, is sub-aerial, and consists in the decomposition of the exposed parts of the primitive crust under the influence of the carbonic acid and moisture of the air, which would convert the complex silicate of the crust into a silicate of alumina, or clay, while the separated lime, magnesia, and alkalis, being converted into carbonates, would be carried down into the sea in a state of solution. The first effect of these dissolved carbonates would be to precipitate the dissolved alumina and the heavy metals, after which would result a decomposition of the chloride of calcium of the sea-water, resulting in the production of carbonate of lime or limestone; and chloride of sodium or common salt. This process is one still going on at the earth's surface, slowly breaking down and destroying the hardest rocks, and aided by mechanical processes, transforming them into clays; although the action, from the comparative rarity of carbonate acid in the atmosphere, is less energetic than in earlier times, when the abundance of this gas and a higher temperature, favored the chemical decomposition of the rocks. But now, as then, every clod of clay formed from the decay of a crystalline rock corresponded to an equivalent of carbonic acid abstracted from the atmosphere, and equivalents of carbonate of lime and common salt formed from the chloride of calcium of the sea-water.

It is very instructive, in this connection, to compare the composition of the waters of the modern ocean with that of the sea in ancient times, whose composition we learn from the fossil sea-waters which are still to be found in certain regions, imprisoned in the pores of the older stratified rocks. These are vastly richer in salts of lime and magnesia than those of the present sea, from which have been separated, by chemical processes, all the carbonate of lime of our limestones with the exception of that derived from the sub-aerial decay of calcareous silicates belonging to the primitive crust.

The gradual removal, in the form of carbonate of lime, of the carbonic acid from the primeval atmosphere, has been connected with great changes in the organic life of the globe. The air was doubtless at first unfit for the respiration of warm-blooded animals, and we find the higher forms of life coming gradually into existence as we approach the present period of a purer air. Calculations lead us to conclude that the amount of carbon thus removed in the form of carbonic acid has been so enormous, that we must suppose the earlier forms of air-breathing animals to have been peculiarly adapted to live in an atmosphere which would probably be too impure to support modern reptilian life. The agency of plants in purifying

the primitive atmosphere was long since pointed out by Brongniart, and our great stores of fossil fuel have been derived from the decomposition, by the ancient vegetation, of the excess of carbonic acid of the early atmosphere, which through this agency was exchanged for oxygen gas. In this connexion the vegetation of former periods presents the curious phenomenon of plants, allied to those now growing beneath the tropics, formerly flourishing within the polar circles. Many ingenious hypothesis have been proposed to account for the warmer climate of earlier times, but are at best unsatisfactory, and it appears to me that the true solution of the problem may be found in the constitution of the early atmosphere, when considered in the light of Dr. Tyndall's beautiful researches on radiant heat. He has found that the presence of a few hundredths of carbonic acid gas in the atmosphere, while offering almost no obstacle to the passage of the solar rays, would suffice to prevent almost entirely the loss by radiation of obscure heat, so that the surface of the land beneath such an atmosphere would become like a vast orchard-house, in which the conditions of climate, necessary to a luxuriant vegetation, would be extended even to the polar regions. This peculiar condition of the early atmosphere cannot fail to have influenced in many other ways the processes going on at the earth's surface. To take a single example: one of the processes by which gypsum may be produced at the earth's surface involves the simultaneous production of carbonate of magnesia. This, being more soluble than the gypsum, is not always now found associated with it, but we have indirect evidence that it was formed, and subsequently carried away, in the case of many gypsum deposits whose thickness indicates a long continuance of the process, under conditions much more perfect and complete than we can attain under our present atmosphere. While studying this reaction, I was led to inquire whether the carbonic acid of the earlier periods might not have favored the formation of gypsum, and I found, by repeating the experiments in an artificial atmosphere impregnated with carbonic acid, that such was really the case. We may thence conclude that the peculiar composition of the primeval atmosphere, was the essential condition under which the great deposits of gypsum, generally associated with magnesian limestones, were formed.

The reactions of the atmosphere which we have considered, would have the effect of breaking down and disintegrating the surface of the primeval globe, covering it everywhere with beds of stratified rock of mechanical or of chemical origin. These would now so deeply cover the partially cooled surface that the amount of heat escaping from below is inconsiderable, although in earlier times it was very much greater, and the increase of temperature met with in descending into the earth must have been many times more rapid than now. The effect of this heat upon the buried sediments would be to soften them, producing new chemical reactions be-

tween their elements, and converting them into what are known as crystalline or metamorphic rocks, such as gneiss, greenstone, granite, etc. We are often told that granite is the primitive rock or substratum of the earth, but this is not only unproved, but extremely improbable. As I endeavored to show in the early part of this lecture, the composition of this primitive rock, now everywhere hidden, must have been very much like that of a slag or lava, and there are excellent chemical reasons for maintaining that granite is in every case a rock of sedimentary origin—that is to say, it is made up of materials which are deposited from water like beds of modern sand and gravel, and includes in its composition quartz, which so far as we know, can only be generated by aqueous agencies, and at comparatively low temperatures.

The action of heat upon many buried sedimentary rocks, however, not only softens or melts them, but gives rise to a great disengagement of gases, such as carbonic and hydrochloric acids, and sulphur compounds, all results of the reaction of the elements of sedimentary rocks, heated in presence of the water which everywhere filled their pores. In the products thus generated we have a rational explanation of the chemical phenomena of volcanos, which are vents through which these fused rock and confined gases find their way to the surface of the earth. In some cases, as where there is no disengagement of gases, the fused or half-fused rocks solidify *in situ*, or in rents or fissures in the overlying strata, and constitute eruptive or plutonic rocks like granite and basalt.

This theory of volcanic phenomena was put forward in germ by Sir John F. W. Herschel, thirty years since, and, as I have during the past few years endeavored to show, it is the one most in accordance with what we know both of the chemistry and the physics of the earth. That all volcanic and plutonic phenomena have their seat in the deeply buried and softened zone of sedimentary deposits of the earth, and not in its primitive nucleus, accords with the conclusions already arrived at relative to the solidity of that nucleus; and also with the remarkable mathematical and astronomical deductions of the late Mr. Hopkins, of Cambridge, based upon the phenomena of precession and nutation; those of Archdeacon Pratt; and those of Professor Thompson on the theory of the tides; all of which lead to the same conclusion—namely, that the earth, if not solid to the centre, must have a crust several hundred miles in thickness, which would practically exclude it from any participation in the plutonic phenomena of the earth's surface, except such as would result from its high temperature communicated by conduction to the sedimentary strata reposing upon it.

The old question between the plutonists and the neptunists, which divided the scientific world in the last generation, was, in brief, this—whether fire or water had been the great agent in giving origin and form to

the rocks of the earth's crust. While some maintained the direct igneous origin of such rocks as gneiss, mica-schist, and serpentine, and ascribed to fire the filling of metallic veins, others—the neptunian school—were disposed to shut their eyes to the evidences of igneous action on the earth, and even sought to derive all rocks from a primal aqueous magma. In the light of the exposition which I have laid before you this evening, we can, I think, render justice to both of these opposing schools. We have seen how actions dependent on water and acid solutions have operated on the primitive plutonic mass, and how the resulting aqueous sediments, when deeply buried, come again within the domain of fire, to be transformed into crystalline and so-called plutonic or volcanic rocks.

The scheme which I have endeavored to put before you in the short time allotted, is, as I have endeavored to show, in strict conformity with known chemical laws and the facts of physical and geological science. Did time permit, I would gladly have attempted to demonstrate at greater length its adaptation to the explanation of the origin of the various classes of rocks, of metallic veins and deposits of mineral springs, and of gaseous exhalation. I shall not, however, have failed in my object, if, in the hour which we have spent together, I shall have succeeded in showing that chemistry is able to throw a great light upon the history of the formation of our globe, and to explain in a satisfactory manner some of the most difficult problems of geology; and I feel that there is a peculiar fitness in bringing such an exposition before the members of this Royal Institution, which has been for so many years devoted to the study of pure science, and whose glory it is, through the illustrious men who have filled, and those who now fill, its professorial chairs, to have contributed more than any other school in the world to the progress of modern chemistry and physics.

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If by gaining knowledge we destroy our health, we labor for a thing that will be useless in our hands: and if by harrassing our bodies (though with a design to render ourselves more useful), we deprive ourselves of the abilities and opportunities of doing that good which we might have done with a meaner talent, we rob God of so much service, and our neighbors of all that help which in a state of health, with moderate knowledge, we might have been able to perform. He that sinks his vessel by overloading it, though it be with gold and silver and precious stones, will give his owner but an ill account of his voyage.

Look for vigorous children in open lots and sheep-pastures, rather than in great parks with rolled walks and shaven sward. In these the roving instinct is denied; the feet cannot follow the eyes; omnipresent restrictions fetter.

## GRAMMATICAL NOTES.

## V.—NONE, MINE, THINE, HERS, OURS, YOURS, THEIRS.

THERE is a puzzling diversity among grammarians in their naming and treatment of these words, which is altogether unsatisfactory, and indeed uncalled for. Scarcely two are wholly agreed, and even the same author often presents gross inconsistencies respecting them. We will endeavor to clear up this subject as well as we can in the space here allowed us.

I. NONE.—We are sometimes told that this is a compound of *no* and *one*. But such is not the case. It is only another form for the word *no*, and affords us one of the very few instances in English of that change in the termination of a word in which the ancient Greeks indulged so freely, viz., the appending of an *n* sound to a word ending in a vowel when used before another vowel, or before a pause. "Thou shalt have *none* [no] other gods before me." "Thou shalt have *none* [no] assurance of thy life." "He wolde techen him to have *non* awe [no fear] in swiche a cas of the archedekeenes curse."—Chaucer. "I have *noon* housebonde" [no husband.]—*Jno.* iv. 17. *Wickliffe's Trans.* (Compare, "Syr thou hast *noo* thyng to drawe it with all."—*Jno.* iv. 11. *Tyndale's Trans.*) Here, *none* is no compound, but simply *no* with the sound of *n* appended. This "paragogic" or "euphonic" *n*, as the Greek grammars call it, at no time much employed in English, is now, as a thing invariably adopted before a vowel sound, confined to the single case of the article *a*, which, when we have occasion to use it, always appears under the form of *an*, instead of *a*, before a vowel sound. Similar to this, though now no longer employed, is the above use of *none* for *no*. But before a pause, in the end of a clause, or when not followed by the word it limits, *no* still passes into *none*. "In Eske or Liddel, fords were *none*"—there were *no* fords. "We honestly wish *no* harm to the South, to their commerce *none*, to their husbandry *none*, *none* to their schools and colleges," etc. "An apparent error, which indeed is *none* [*Anc.*, none error; *Mod.*, no error,] of theirs." "He is *none* [in *no* respect] the wiser for his pains." "Thoughts, for which we have either *none* [no names], or very difficult names." "The Lord is God, and there is *none* [no God] else." Here, again, *none* is not a compound, but a form which the word *no* assumes, simply in consequence of the position in which it is placed. To a Greek scholar, the mere mention of this must be sufficient. Instances, precisely similar, are continually occurring in the Greek language.

For this form of *no* under these circumstances, a characteristic name seems to be needed. We would propose calling it the *acritic* form, *not leaning* upon any word, in distinction from what might, on the other hand,



be called the *epiclititic*\* form, namely "no," always leaning, as it does, upon some other word. We thus have, grammatically, three distinct forms of the word *no*, which may be designated as follows :—

1. The EUPHONIC, or *none*, before a vowel sound ; as, "To *none* other one was this privilege granted." This form may be considered obsolescent. In the English of the present day, *no* is almost invariably used instead of this euphonic *none*.

2. The ACLITIC, or *none*, before a pause, or when the word it limits is suppressed ; as, "Silver and gold have I *none*." "We searched for water, but there was *none* to be found."

3. The EPICLITIC, or *no*, always followed by the limited word, or some word that answers to it ; as, "No one ;" "No real obstacle ;" "If thou wilt take that, take it ; for there is *no other* here."

II. MINE, THINE.—What is true of *none*, is also true of *mine* and *thine* ; that is to say, they are but different forms for *my* and *thy*, each of which, like *no*, appears under three distinct heads.

1. A EUPHONIC form ; namely, *mine* and *thine* before a vowel sound ; as, "A man *mine* equal ;" "Thine arm ;" "Mine host." This form is now rarely used except in prayer and poetry.

2. An ACLITIC form ; namely, *mine* and *thine* when not followed by the limited word, or any word that answers to it ; as, "Your horse trots well, but *mine* paces ;" "The king, *mine* and your master ;" "I wish not it were *mine* to wear flushed honor's sunny crown ;" "Lady *mine*, scorn not these flowers of thought ;" "I fear those eyes of *thine* ;" "Thine is the kingdom," etc.

3. An EPICLITIC form, namely, *my* and *thy*, always followed by the limited word, or if that is suppressed, by *own* ; as, "This is *my* reply ;" "The loss will be *my own* ;" "Thy clear and smooth, uninterrupted way."

III. OURS, YOURS, HERS, THEIRS.—These forms differ from the preceding in two respects,—in termination, and in the number of uses. Like certain Greek works, they take an *s* instead of an *n* sound ; though among the vulgar, the forms *ourn*, *yourn*, *hern*, and *theirn*, as well as *hism*, are not unfrequently heard,—forms that are really analogous to *mine*, *thine*, and *none*, though sometimes improperly supposed to be contractions of *our own*, *your own*, etc. This movable *s* is the same in character with the movable *n* (or *ne*) of *none* and *mine*, except that it is not appended for euphony before a vowel ; for we say "our *aims*," and "our *ends*," as well as

\* The term "enclitic" is already employed as designating a syllable or word that leans or falls back on a previous word for support, so as to seem to be a part of it ; so that the above terms—*aclitic* and *epiclititic*—would not be altogether new or strange, while they would supply a real want in the terminology of English Grammar. Under the designation of "epiclitics"—words that are never used without some other word for them to lean on—the articles *a* or *an* and *the*, two or three adjectives like *every*, and the pronouns *my*, *our*, etc., would naturally be included, as well as *no*.

"our names, and "our friends." That is to say, it appears at the end of *our*, *your*, etc., when these words are adclitic, and disappears when they are epiclitic. This we conceive to be the true explanation of these forms. As *an* is the same word as *a* under different circumstances, so *none*, *mine*, *thine*, *ours*, *yours*, *hers*, and *theirs* are the same words as *no*, *my*, *thy*, *our*, *your*, *her*, and *their*, under different circumstances. These different circumstances call for names by which the words, as differently circumstanced, may be known. And these we have endeavored to supply.

Now, as to the part of speech to which these words shall be severally assigned. As *no* (i. e. the *no* which undergoes this variation), is an adjective, *none*, if it is the same word, must be an adjective too. It is true, there are cases in which it seems (in consequence of the suppression of the noun it limits), to be a pronoun rather than an adjective. Ex. 1. "*None* [no one, no person, or no persons,] knew thee but to love thee." 2. "*None* [no persons] of us were present." 3. "The chamber was *none* [no chamber, or not a chamber] of the best" [character or sort.] If any one prefers to call the word, in cases like these, a pronoun, he is certainly privileged to do so. He would be but following the analogy of calling *which*, when the limited noun is suppressed, a pronoun instead of an adjective. Perhaps, in cases like those given in examples 2 and 3, i. e. when *none* is followed by *of*, it would be as well to call it a pronoun. But then, the question would be, What sort of a pronoun is it? An adjective pronoun? Not if it has lost its adjective character, which it is supposed to have done, if it has become a pronoun. Under other circumstances, we think it far better to regard the word as an adjective, adclitic form, limiting some word understood.

As to the remaining words, we should not think of calling them anything but the possessive case of the respective personal pronouns to which they are commonly assigned,—*my*, *our*, etc., being the epiclitic, and *mine*, *ours*, etc., the corresponding adclitic forms. This, to us, seems the simplest, and in fact the true and only consistent way of treating them. Others, however, think differently.

Some call the epiclitic forms *my*, *thy*, *our*, etc., "pronominal adjectives." But it would be just as proper to give the name of "adjectives" to nouns in the possessive case, when followed by the word they limit; as, "*Mary's book*." Others call them "adjective pronouns;" because, say they, like adjectives they qualify nouns, and like pronouns, they stand instead of nouns. In "standing instead of nouns," they are pronouns; and in qualifying or limiting nouns, they are only performing the part of the possessive case. So that nothing is gained by calling them adjective pronouns, any more than there would be in calling nouns, when similarly situated, adjective nouns.

On the other hand, some do not recognize the adclitic forms, *mine*, *ours*,

etc., as possessive case forms at all, but call them possessive pronouns, adjective pronouns, double pronouns, or something else. Among these, is Webster, who, in his "Improved Grammar," p. 26, argues thus:—"These words are constantly used as nominatives to verbs, and as objectives to verbs and propositions; and to say that they form a possessive case, is to make the possessive perform the offices of the nominative and the objective—a manifest solecism." The force of this reasoning may be seen by comparing the following sentences: "My sword and *yours* are kin;" "My sword and *John's* are kin." "James bought my books and *hers* in the city;" "James bought my books and *Mary's* in the city." "Your eyes are good, but *mine* [eyes] are not;" "Your eyes are good, but *William's* are not." Webster's argument will apply quite as well to *John's*, *Mary's*, and *William's* as to *yours*, *hers*, and *mine*. The only difference here is, that *your*, *her*, and *my*, unlike *John's*, *Mary's*, and *William's*, but not unlike the article *a*, are favored with a movable letter, which, like a hat, may and should be donned under certain circumstances, and under other circumstances should be doffed; either of which may be done without changing the character of the wearer.

Welch's treatment of these unfortunates is peculiar. See his "Analysis of the English Sentence," p. 44. He begins by calling them "Double Pronouns." "These pronouns," he says, "*always* represent two nouns, [mark the words 'two nouns;'] viz., the name of the possessor, and the *thing* possessed; [again, mark the language, 'the *thing* possessed;'] i. e. one of the 'nouns' is the '*thing*' possessed!] hence, they are called double pronouns. [Very clear!] Ex. 'His property was saved, but *mine* was lost.' *Mine*," he continues, "is a double pronoun. Representing the [~~per~~] *thing* possessed, i. e. property, it is a pronoun, third person, plural [1] number, subject of the sentence '*mine* was lost.' Representing the possessor, [not, as he says above, the *name* of the possessor, but the thing itself—the possessor!] it is first person, singular number, and an adjunct of the subject;" i. e. of itself! A "double pronoun" surely! Double and twisted rather! representing two very queer-looking "nouns," one of them "the possessor"—the man or the woman whose property was lost—and the other "the thing [once, but no longer] possessed"—the property lost! Besides, it is both first person and third, neuter and masculine, singular and plural, nominative and possessive, subject of the sentence and its own modifier, at one and the same time! This is rich, the *ne plus ultra* of grammatical accuracy and lucidity! It reminds us of an effort of one of our own pupils a few years ago. The sentence before the class was, "I met Jane this morning, and the girl gave me her hand." It fell to the lad's lot to parse the word *girl*. After calling it a noun, he hesitated. On being asked what kind of a noun? he replied, "a pronoun." A smile, of course, passed around. He, however, was not going to be

laughed out of it, but pluckily asked at once, "Is n't it used instead of the noun *Jane*?" In calling *girl* a pronoun, he certainly had the definition of his grammar to support him. Welch, in like manner, in the above exposition, is only consistently carrying out the doctrine of Webster, J. Hunter, B. H. Smart, and others, who say that *ours*, *yours*, etc., are not in the possessive case.

Care should be taken in parsing such a sentence as, "Your horse trots well, but mine paces," not to say with Kerl, (Comprehensive Gr., p. 51), that "*mine* is here used for *my horse*." In a grammatical point of view, *mine* is used only for *my*, and should be parsed as such alone. If *John's* were substituted for *mine* in this sentence, we might, with equal propriety, say that *John's* was used for *John's horse*, and "parse the *two* words," as Kerl directs in regard to *my horse*, which he substitutes for *mine*, under the idea that the two are, some how or other, bound up together in the given word, and must needs both be parsed, instead of the *one* alone which the text presents. This is Webster's error,—the supposing that *mine* here is a substitute for *horse*, or *my horse*; whereas, it is a substitute for *my* only, and should be parsed accordingly.

In certain connections, persons are sometimes in doubt whether to use the epiclitic or the acclitic form of these words. For example, shall we say, "I received *your* and Mary's letters last evening;" or, "I received *yours* and Mary's letters?" Kerl, and others doubtless, would say, "Your letter and Mary's." But this can not always be done. Besides, it is not answering the question. It is an attempt to get around it, rather than to solve it. On the supposition that we use one or the other of the above forms, we wish to know which of them is the proper one. Prof. Fowler, (Gram. p. 289), says, we should say, "'Yours and her ancestors,' if the ancestors are different; but, if they are the same, '*your* and her ancestors.'" Herein, however, he is not sustained by the usage and authority of the best English writers. Witness the following examples. 1. "All that in every place call upon the name of Jesus Christ our Lord, both *theirs* and *ours*."—1 Cor. i. 2. That is, "their Lord, as well as ours." 2. "That seal the king, *mine* and your master, gave me."—Shak. Henry VIII. 3. "That war had its commencement in *mine* and my brother's blood."—Stebbins; Ital. Poets, I. p. 297. 4. "Peace was necessary not only to *theirs*, but to his own safety."—Do. p. 300. 5. "I have no company now, except *yours* and my aunt's."—Spencer; Past. Sk. I. p. 51. 6. "Having good works enough to secure *yours* and their immortality."—Wycherly to Pope. In fact, this is necessarily the correct mode of expression, inasmuch as *my*, *our*, etc., are epiclitic, and need some word on which to lean. They cannot rightly be separated from their noun by any expression that requires to be coupled to them by a conjunction.

## JOHN BOYD.

## CHAPTER XXIV.

THERE is a sort of calculation which does not take into account the details of petty causes and effects ; a calculation of faith, looking for a prosperity to ensue from good works, based upon the testimony of a good conscience, tried by doubts and by what men call precariousness, but discerning amidst the thickest darkness of uncertainty promises of reward for well doing, with a confident reliance that renders the promises quite as the substance of the reward promised. During the episode in Boyd's life, beginning on the sombre day in December when he left his house and home to go into the world, and reaching to the present, he had been like one ready to play in the game of life, but to play honestly. He had never once resorted to trickery. He had always been outspoken for what he deemed to be the right. And now as he walked along the road in Deerslaugh, he walked by faith and not by sight. He could not see his way in life ; but he felt that the way would be opened for him. What the way would be, whither it would lead him, were questions he sought to answer, but the only response to them was one suggested by the feeling that the way would lead him back to his old home. "Atheism is not in my heart," he thought. "There is a God, and he is directing my steps—surely in love ; whether through trials such as are needful to discipline, remains to be seen."

This thought was in his mind and was drawing his attention away from surrounding things, when he heard some one utter an exclamation and call his name. The voice was familiar. It was Millie's. He had approached the house and she was looking from a window. She instantly left the window and came out to meet him.

"Why, John, how glad I am to see you !" and then she scrutinized his face. A woman—a girl—will read your story in your face. "Have you left that place ?" she asked. "Yes," he replied. "But how did you know it ?" "Come in," she said. "I have left the place," said John. "I suppose I must get my wits sharpened that I may live. There was too much wire-pulling, and I bungled. When people were mean I told them so. I relied upon principle. But I don't believe that place represents the great world.—Well, how are you all ?" John was about to open the door of the room from which Millie had come, when she pulled him back. "He's there," said she. "Who ?" "Why—Mr. Brookhouse," she replied, blushing and laughing. John stood and looked into her face. "Mr. Brookhouse senior ?" he said presently. "Why, no. Mr. Brookhouse senior ! Why, no, indeed !" "What makes you blush so ?" "Come in and see him," she said, reaching out her hand to the door. John held her back. "Millie," said he, "are you engaged to that man ?

—You are. When you marry I wish you would marry under my roof, in the old homestead. Now you start and look at me. It is one of my dreams, Millie,—a dream as eager as your present dream, but far less practical—matrimony is practical, after all, and not a dream—it is my dream that I am to be reinstated as master at the old house. Will you promise not to marry until you may marry there, under my roof?"

John opened the door without exacting the promise; but he was too restless to remain in the house. He exchanged greetings with his aunt and uncle and walked out. The old homestead was strangely fascinating. Thither he turned his steps again.

On the side of the hill near the house was a cluster of large elms. He used to lie on the grass in their shadow on summer afternoons, and now he went there again, seeking a place where the branches, hanging low towards the ground, would conceal him from view. He had a new experience to reflect upon now; and the sun went down while he lay there in a reverie. After a while, however, he turned to rise. Shifting his posture he leaned upon his elbow, resting his head upon his hand. Then he first became aware that he was not alone. A figure sat leaning against the trunk of a tree close by, and crouched together with the knees drawn up and the face peering over them at him. It was the identical grotesque and weird figure that had so astonished the audience at Comfort. A strip of the white vest was visible beside each knee. There were the blue coat and brass buttons, the white face with the long black lock hanging from the chin, and the three strips of black hair on the top of the head, with the alternate stripes of white.

The two sat and looked at each other full three minutes without speaking; John broke the silence. "Do you know the language of earth?" The goblin nodded. "Before we shake hands," said John, "hadn't you better go and cool yourself in the brook? You are in a white heat." "Mortal," said the spectre, "thy days are numbered." "Speak in a voice less sepulchral; you frighten me." "I am from Tartarus. Go thither thou must—read that." The goblin with a fiendish grimace and snuffle, drew from his side-pocket a paper, which he balanced on his chin, above the black lock, and then he turned a sudden somersault, clapping his feet together in the air, and uttering a malignant yell. During this feat the document flew towards John and rested on the grass just before his face.

John took up the paper and opened it. His eyes rested upon the caption, and he started up and read eagerly. The blood rushed to his face. His hands trembled. He sprang to his feet. "In heaven's name, Prague," he exclaimed, "what does this mean?" "It is *bona fide*," said Prague, "I found it in the little closet. You didn't search closely." John sprang to Prague and pulled him up into his arms. Prague gently released himself. "Will you go down and show it to Tilden now?" he



asked. "It is dated but two days before his death," said John, still poring over the manuscript, "and it wills all the property to me. It renders the first will null and void. 'Tis his signature. I know it. Tilden had no other property. This homestead's mine again." "Come on," said Pragge, "I want to hear the will read. I found it after a while. I looked long. There was a curious little safe in the side of the little closet—what has been the matter with you?"

They shook hands and proceeded to the house. When the door was opened by Tilden's mother, Pragge concealed himself lest his appearance should too much astonish her. But when she went to call her son he managed to slip into the parlor, where John was ushered. Pragge at once took a very striking position, seating himself on the back of a chair and resting his feet on the mantel. That did not quite suit him. He left the chair and lodged himself at full length on the mantel.

Presently Tilden entered, the very impersonation of inhospitality and inquisitiveness. His back was turned towards the mantel where Pragge was, and he was absorbed with looking at John.

"How are you?" said John, accosting his cousin hospitably. "Glad to see you. Take a seat."

John placed a seat for him so that his back would still be towards Pragge. Tilden was speechless in view of the patronage bestowed upon him in his own house. John settled down into his old study chair. Tilden's mother had removed it to this room. "Well," said John, "I'm glad to get into my own house again. You don't wonder at it, do you?" A groan sounded from the northeast side of the room, and Tilden looked around there in amazement at Pragge. John produced the will. "There's the last will and testament of Welford Boyd," said he. "There's the document," fell in sepulchral tones of confirmation from the direction of the mantel. Tilden turned again and stared at his grotesque visitor. Finally he began to have a glimmering of the fact that it was Pragge. "Yes," said Pragge, "there's the last will and testament of your lamented uncle."

"It is a lie!" exclaimed Tilden, trembling and turning white.

"Will you give up the property now," said John, "or face the law and let people witness your ejection?" Tilden sank into a chair. "He made no second will," he said presently. "That is a forgery." "I found it in a little safe within the little closet in your lamented uncle's little—," Tilden sprang up from his chair and glared at Pragge as though he would have torn him to pieces. Pragge winked at him. Tilden turned and paced the floor to and fro a few moments; then he stopped and turned to John, "Let me look at it," he said. "Don't tear it," said Pragge, by way of caution. John held the will toward the light for Tilden to look at the signature and to find out its purport.

## CHAPTER XXV.

As soon as John entered his uncle's house on his return, he was met by Millie. "Where have you been?" she asked. "Have you been at the house?—What have you been doing?—You haven't got your place back!" When I come into my kingdom, Millie," said John, "I shall make you my chief seer. Why do you ask such questions?" "Your face looks as though you had." "It looks so because I'm so glad to see you." "Well, come to supper. We've been waiting for you this hour."

One bright breezy afternoon, a few days afterwards, John proposed a visit to the old homestead. The party consisted of himself, Millie, and her father and mother, and Miss Brookhouse, who was visiting there. On the way hardly a word was spoken, save by John and his uncle, for the impression was that John was about to leave Deerslaugh again, to make his way in the world, an impression which produced a sombre feeling. The walk was a gloomy one for so pleasant an afternoon. Arrived at the gate they stood and looked over. Flowers were blooming in the garden—such flowers as the weeds had not choked. Millie expressed a wish to have some of them to press between the leaves of a book. "Let us go in," said John, opening the gate; and they entered. Some shrubbery at first concealed from them the front door of the house, but as they sauntered on it at length came into view. Some one was sitting on the step. "There's that Praggie," exclaimed Millie. "Take some of those flowers, Millie," said John, and Millie stooped to cull some. A harsh shout sounded from the door-step. "Hei, let those flowers alone!" John stooped and gathered some, and handed them to Miss Brookhouse and Millie, remarking, "That was an inhospitable sound." "I suppose the law is on their side," said Uncle Wells. "Let's leave them, the coarse things," said Millie, curling her lip. John took out his knife and stooped and gathered together a large bunch of flowers, and cut them off and handed them to the ladies. Praggie sprang to his feet and shook his fist. "I know you," he called, "that's Penthesilea. I've seen her before. She tried to hinder me in the discharge of my official duty, once, when I was appraising the furniture in this house. Bulkstroth will prove it. It was a criminal offence." "Let's go up there," said John. "He's demented, I guess," said Uncle Wells. "I'll box his ears for him," said Mrs. Boyd. As they drew near they discovered some one sitting in the entry. Millie seized John's arm. "John," she whispered, "why, John—do look. Is that Mr. Brookhouse?" A deep roar of laughter came from the entry, and then Mr. Brookhouse, senior, came out to meet them. John shook hands with Praggie. Upon entering, Miss Woodstock presented herself. They went into the long parlor, and Praggie withdrew; but presently a curtain at the lower end was raised, and Praggie and some of the Wyo

boys appeared in a tableau ; and then boys flowed into the room at every door, until it was clear that the house was overflowing with them.

The afternoon and evening passed merrily. A part of the time was devoted to tableaux and dramas, under the management of Pragge, the characters being enacted by him and the Wye boys. Pragge's consummate acting, and feats of ground and lofty tumbling, excited the admiration of all.

Not many weeks afterwards there was assembled in John Boyd's house a party, that followed upon a wedding—that of Millie Boyd and George Brookhouse. John being a bachelor, verging apparently upon a state of confirmation in bachelorhood, was at one time during the evening encircled by some serio-comic friends (ladies), who insisted on knowing why he did not get married. "Because I'm not old enough," was his explanation. But they would not let him off so easily. Whereupon he said soberly, that it was partly because he didn't love any body, and he did not think any ought to marry unless there was mutual love between the parties. Then the name of Gwynne Brookhouse was whispered about. She was not among them at the time.

Several years afterwards a resident of Wye was passing that way. He had known John, and he stopped to speak with him. A pleasant scene was presenting itself in front of the house. It was a summer afternoon. A party were sitting together under the elms—John and Gwynne, and Mr. Brookhouse junior, and Millie. Two children were playing on the grass. Pragge was seated on the doorstep. In the manner of an intensely respectable member of society, he enquired of the visitor about Professor Beelen. "The Professor has grown hard," said the visitor. "He has quite lost his soul. His politeness has increased ten-fold ; or rather it has become obsequiousness. He bows low, and to everybody he meets ; at the same time he has no sympathy with any one. He sees life not as a game for subsistence by the honest use of the wits, but as a scene where the wits are to be used as though every man's hand was against him, and he was to live by undermining, ousting, lobbying, button-holing and falsifying. He is not respected, but he is tolerated. He is living the hard life of the misanthrope and the hypocrite."

The visitor ceased speaking. Pragge turned to John. "Had n't we better invite the Professor to lecture before the young men here?" he asked. A deep roar rolled out from the cool depths of the entry. The visitor peered in and saw Mr. Brookhouse senior's red-sandstone face in its granite setting.

A train of cars arrived, and presently some young men were seen approaching. "Here come my boys," said John rising. Boys !—even at that distance the side-whiskers were almost discernible. The visitor glanced up at a window, and a pair of large dark eyes met his. Miss Woodstock sat there writing. John was among his friends.

## THE MONTHLY.—DECEMBER.

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### ASSOCIATION BETWEEN TEACHERS AND SCHOLARS.

THE extent of association necessary between teachers and their pupils renders it probable that a marked effect should be produced upon the characters of each by the influence of the other. The natural law of association by which like produces like,—as, for instance, a refined character produces refinement in those with whom it associates, a coarse character produces coarseness, a large character produces largeness, and a little character, littleness,—is ever seeking to assert itself in the intercourse of the school-room. The readiness of human nature to adapt itself to circumstances by losing its sensibility to the operation of influences which it at one time may have consciously regarded as beneficial and to be sought, or as pernicious and to be avoided, renders it almost inevitable that this association should produce its peculiar effect. So obvious, however, is the effect upon the characters of many of those concerned, that the subject becomes one of frequent discussion among teachers themselves. Sometimes they approach it hopefully, sometimes regretfully.

As things are there is no question that there is occasion for the exercise of a feeling of regret as well as of hope. There is too much exclusive association with pupils for the good either of them or of the teacher. Relatively to the great world in which grown up people are engaged in playing the game of life, the school-room is obscure. It holds the teacher in obscurity during business hours. It holds him away from the enlarging and strengthening influence of contact with busy men, and brings him under the belittling influence of long continued contact with busy children. He learns to sympathise with them in their pettiness; he becomes the petty arbiter in their petty disputes; too much does he become the prey to the petty emotion of vexation. He does not thus contemplate the child-like merely, but the childish; and there is eminent danger of his becoming the grotesque imitation of a boy. At least there is danger of his becoming intensely impracticable—a character not only not likely to command respect among men, but even to lose it among children. Children like to have the company of their elders only when the latter are sympa-

thetic, but unlike themselves, beings who will notice them and at the same time satisfy their instincts by saying or doing something which to them is great. Children see through an impracticable man. But the pettiness of character which arises from the habitual experience of vexation, or from the habitual exercise of petty arbitership in the affairs of children, clings to the teacher outside. This, whether the teacher be male or female. We have listened to an eloquent female orator, once a teacher, whose *sharpness* would sometimes manifest itself in a disposition to bestow upon some person in her crowded audience a good cuffing; and we have in mind a popular authoress, once a teacher, whose works we believe are doing great good, who displays the same kind of sharpness in her writings. In a man the appearance of school-room pettiness is more melancholy than in a woman. The man of the world perceives in him a weakness of character. He manifests a disposition to arbitrate in matters long settled as being best settled; he preaches truisms as though they had just dawned upon his mind in original freshness; he dwells on little things as boys do; his wit and humor are puerile; he cants about the practical. We were lately present at an interview between a fossil of this sort and a man of the world, who was conducting a large enterprise, and was pressed with business. The fossil began to tell the man of business how he ought to manage the concerns of his enterprise, whereupon the latter took him up so impatiently that the interview ended at once. "He is what one would call a dead beat," said the man of business, after the fossil had gone out. We have indeed heard a prominent teacher and member of a Board of Education rise and address the Board upon the necessity of providing means to counteract the "fossilizing influences" of the teacher's circumstances.

That there are remedies we believe. A great part of the remedy, mayhap, exists in the very nature of the vocation itself. To get at the child-like in a child is wondrously humanizing. Is it done enough? There are teachers who are remarkably pleasing in society, men and women noted for their genial characters. Their pupils resemble them. They cultivate good feeling. They tolerate natural laughter. They turn away wrath till it forgets to rise. They control by reason. The law of kindness prevails in the scene of their endeavors. Patience works out its perfect work. The influence of association under such regulation is not so belittling. It is indeed enlarging and strengthening. But with many, perhaps with most who reject the misanthropic view of pupil nature, and deliberately act upon

the philanthropic view—we speak not censoriously; we are of them,—patience does not work out its perfect work. The brood of disturbing causes, which press upon the track of impatience, rush in, and the work of belittling goes on. Even where patience rules, there is need of the enlarging and practicalizing influence of counter contact with the world of grown up people. How much more in the latter case?

Would not the interests of both teachers and pupils be greatly served if the hours of daily association should be shortened so that the teacher's attention should not become habitually absorbed with the business of his vocation, and so that he would have time and vigor to devote to the concerns of the outside world? We would not advocate that his wages be consequently diminished. Teaching would still be his distinguishing vocation, and the arrangement would be made for the purpose of rendering him more efficient. We believe that the best teacher would be the one who should be most practical in the affairs of life. The time, we think, is coming when the middle ages will have less hold upon our schools in confining our pupils so closely to mere bookishness, and when the principles of knowledge will be taught as they are found in the latest stages of their development, and in active use in the great business of the world in these latter days.

In the association between teachers and their pupils, regulated by some counter influence which would remove from it the character of exclusiveness, we think that a degree of intimacy amounting to companionship ought to enter; an enjoyable intimacy; a companionship such as will enable the teacher to stir up the spirit of enquiry in the pupil, and will enable the pupil to ply his questions freely, and thus to make unlimited use of the teacher's intelligence. By such association the teacher could realize more largely the fulfillment of his desire in seeing his influence produce its distinct mark for good upon the generation that is about to take the place of that which is passing away.

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#### DEVELOPMENT AND DISCIPLINE.

**D**EVELOPMENT first: discipline afterwards. This is the true order and business of education.

Because certain studies have been accounted excellent as mental gym-



nastics for students of mature age, they are held by many teachers as deserving the first rank in primary education also, in spite of the fact that their successful study calls for the exercise of faculties which children have yet to develop.

In a reaction against the tyranny of these disciplinary studies, other teachers have gone to the opposite extreme, and would give none but so called practical studies a place in school curriculums. And it often happens—when, as is too often the case, the teacher is one whose idea of practical value never rises above dollars and cents,—the whole force of a school is expended in such an ill-considered manner that neither available knowledge, practical skill, nor mental discipline is secured in any considerable degree.

Those who would make mental discipline the chief object in primary as well as of higher education, are generally superior to the last named class in knowledge and culture ; but their failure as educators is none the less certain. It is useless to attempt to discipline what does not exist, or what is so feebly developed that discipline serves only to check growth. Development, physical as well as mental, should be kept steadily in view as the great business of the primary school. Mental discipline for its own sake has no business there. That remains for the high school, the university, or the world to perfect *after* the faculties are sufficiently matured to be susceptible of discipline.

The pleasurable use of the mental powers in acquiring exactly that knowledge (presented at the right time and in the right way), which the individual will have greatest need of in active life, will, we believe, secure not only the most vigorous mental growth, but also the highest discipline that the mind is capable of. This knowledge the growing mind craves as the growing body craves food. The schools should supply it. After they have outgrown the arbitrary methods imposed when the world was flat, they will supply it. The course usually pursued at present is calculated to produce mental dyspepsia rather than stimulate or even gratify the child's appetite for sensible knowledge. From the day he enters school for the first time, the powers which he takes most pleasure in using, and which nature intends should be developed first, are suppressed, and he is set to acquiring the signs of knowledge which naturally he cares little or nothing for. Consequently the first year of school-life is generally a period of less rapid mental development and progress in knowledge than the year

before. The same discrepancy between what is and what should be is manifested to a greater or less degree throughout the entire school course. The really valuable knowledge which pupils acquire is for the most part obtained out of school; while whatever of mental power or discipline comes to them is as often the result of inevitable growth as the fruit of school training.

There is need of great reformation here. Teachers must be taught to realize that mental growth is as little to be expected from ill-timed and uninteresting studies (however good they may be for adults), as bodily growth from food eaten without relish. Our unnatural methods must give place to the method which nature begins with, and this must be pursued in the spirit of nature, seeking the natural unfolding and growth of the mental faculties by their pleasurable exercise in acquiring and assimilating appropriate mental nutrition, rather than the discipline of the mind by severe exercise or studious application.

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#### THE EDUCATIONAL DEPARTMENT OF THE AMERICAN INSTITUTE EXHIBITION.

ACCORDING to the reports of publishers, manufacturers and school officers, American school books, school apparatus and furniture, are unsurpassed in quantity, variety, and quality. Every day we read of some improvement. And scarcely a week passes in which we are not favored with a call from some sanguine inventor with a new device whereby a perfect revolution is immediately to be effected in some branch of education.

From these facts—not to mention the glowing promises of the managers—we were led to expect at the Fair of the American Institute, this fall, a grand display of means and appliances for the advancement of Education. We have looked long and diligently, so have our friends, but have discovered only two articles that might in any way be counted as Educational—pianos and horsewhips!

Where are our publishers and manufacturers of school apparatus? Are they asleep, or what is the matter, that they let slip such a capital opportunity for advertising their wares, and at the same time, for doing justice to our educational interests? We hope to record a better state of things next year.

## EDUCATIONAL INTELLIGENCE.

THE past collegiate year has been one of unexampled liberality towards our higher educational institutions. Some idea of the aggregate amount of these benefactions may be gathered from the following table given in the *Yale Courant*. In this list no account is made of the amount given, in the way of land grants, to the Agricultural Colleges. The handsome gift of Mr. Cornell was made in 1865, but is given below, as it was not applied until within the last year:—

|  |          |
|--|----------|
| Albion College, Albion, Michigan.....              | \$25,000 |
| Baldwin University, Berea, Ohio.....               | 103,000  |
| Beloit College, Beloit, Wis.....                   | 18,000   |
| Bowdoin College, Brunswick, Me.....                | 27,000   |
| College of New Jersey, Princeton.....              | 20,000   |
| Cornell University, N. Y.....                      | 760,000  |
| Cornell College, Mount Vernon, Iowa.....           | 25,000   |
| Cumberland University, Lebanon, Tenn.....          | 35,000   |
| Dartmouth College, Hanover, N. H.....              | 35,000   |
| Dickinson College, Carlisle, Pa.....               | 100,000  |
| Hamilton College, Clinton, N. Y.....               | 94,000   |
| Hanover College, Hanover, Ind.....                 | 25,000   |
| Harvard College, Cambridge, Mass.....              | 400,000  |
| Kenyon College, Gambier, Ohio.....                 | 35,000   |
| Lafayette College, Easton, Pa.....                 | 90,000   |
| Lawrence University, Appleton, Wis.....            | 20,000   |
| McKendree College, Lebanon, Ill.....               | 20,000   |
| N. W. Christian University, Indianapolis, Ind..... | 35,000   |
| Norwich University, Northfield, Vt.....            | 16,000   |
| Oberlin College, Oberlin, Ohio.....                | 34,000   |
| Otterbein University, Westerville, Ohio.....       | 30,000   |
| Rutgers College, New Brunswick, N. J.....          | 50,000   |
| Shurtleff College, Upper Alton, Ill.....           | 80,000   |
| Tufts College, Medford, Mass.....                  | 300,000  |
| University of Mississippi, Oxford, Miss.....       | 25,000   |
| University of Chicago, Chicago, Ill.....           | 100,000  |
| Wabash College, Crawfordsville, Ind.....           | 40,000   |
| Washington University, St. Louis, Mo.....          | 100,000  |
| Wesleyan University, Middletown, Conn.....         | 98,000   |
| Western University, Pittsburg, Pa.....             | 95,000   |
| Yale College, New Haven, Conn.....                 | 206,000  |

Total of thirty-one Colleges,.....\$3,041,000

In the South, interest appears to be awakening, and serious efforts are being made to advance. In his message, the Governor of Tennessee, after recommending aid to the State universities, says: Common schools and universities of the highest grade go hand in hand. One cannot flourish in a State without the other. The universities furnish teachers for the common schools, and common schools prepare our young

men for entrance to the higher walks of learning in the universities. Such is the relation between the two where education has become universal. Let us show the world that in this State we are alive to the new era, and that we are equal to our pretensions.—In Georgia, the recent State Teachers' Convention passed a resolution that "It is just and wise that all the children within the limits of the State, without distinction of race or color, should receive the benefits of at least a common school education."—In New Orleans, an ordinance passed by the old Council over the Mayor's veto, appropriating \$70,000 for the establishment and support of negro schools, was officially promulgated on October 8th. Separate schools for colored children are being formed, notwithstanding the opposition of many who count themselves the best friends of the negro. This is wise. Forced association of blacks and whites in school or elsewhere, can only work mischief, from which the blacks will be the greatest sufferers.

In Europe everywhere the great social question of the day is educational reform. In Great Britain especially it is the exciting topic. The British Association for the advancement of Science, makes an urgent appeal to the government to promote scientific education in the schools. A commission appointed by the Queen to inquire respecting the condition of Technical education, have reported strongly in favor of introducing a more extended course of Physical study, and have asserted that it is owing to a lack of such a course, the rate of progress recently made in manufacturing and mechanical industry in England is inferior compared with that made in other countries. The London International College has so far broken the trammels as to make the teaching of Natural Sciences an important part of its training. The Lord Mayor of Dublin has petitioned Parliament to enlarge the educational area of Trinity College. It was moved to throw open the fellowships and scholarships of the University to others than members of the established church. The motion was lost by a tie vote, the Speaker refusing to decide. A bill was introduced into the House of Commons favoring compulsory education, and the rating of schools. Owing to bitter opposition from the country members, the bill was withdrawn. At the Social Science Congress, which met in Dublin during the latter part of September, Rev. Dr. McCosh read an able paper favoring compulsory education. It led to a long and animated discussion, which proved the majority of the section to be in favor of compulsion. £259,700 have been voted for public education in Ireland. The whole number of pupils enrolled in the national schools in December, 1866, was 910,000, and the average daily attendance only 316,000, little more than 34 per cent. There were 6,400 schools, 4,000 of which were sectarian, being under the control of Roman Catholic church. Only about 17 per cent. of the expenses is contributed locally; the rest is borne by the government.—The report upon English schools shows 13,586 schools in 1866, with 1,287,604 pupils. The number of pupil teachers was 10,955, nearly 3,000 less than in 1863. The number of school-masters is diminishing, that of mistresses increasing. The average salary of masters is £87, and the majority live rent free besides.—An enthusiastic meeting of Scotch teachers was lately held, at which it was unanimously agreed that some system of compulsory education for Scotland, more or less modified, is desirable, as, in the opinion of this meeting, the only measure calculated to insure to every member of the community the full benefits of a national system

of education.—In France workmen are deriving great benefits from the system of night schools, now in successful operation. Over thirty thousand of these schools have been opened, wherein forty thousand teachers furnish gratuitous instruction to 823,000 adult scholars. Fully one-third of these scholars had been entirely without educational advantages prior to the opening of these schools. At a late competitive examination in writing, 5,168 adult laborers and mechanics entered the lists, and 1,200 of them prepared compositions that were correct in orthography, syntax, and general arrangement. Aside from the literary advantages of these schools, their moral effect is excellent, and the President of the French Corps Legislatif lately bore witness to the great falling off in drunkenness and quarrelling among foundry and other workmen in consequence of the school influences.—Russia is also advancing the educational movement. A system of public instruction is being organized, the schools and teachers to be supported by the government. The secular education will be taken entirely out of the hands of the clergy. At present 1,120,000 children only—one and a half per cent. of the population—attend school.

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### CURRENT PUBLICATIONS.

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WE have here a new edition of a text-book,<sup>1</sup> which has long been favorably known to the public, and of which it is unnecessary to speak. That work, we find, has been re-written to a great extent, and enlarged by the addition of nearly one hundred pages of new and generally valuable matter, thus making the present edition, in most respects, greatly superior to the old. A copious index of five and a half pages, double columns, is prefixed to the whole, enabling the teacher or student to turn readily to any desired topic. A new feature of the book is the "peculiar use" of certain words, to which some thirteen pages are devoted. The study of these pages can not but clear up many points of intricacy and doubt to the student. We are sorry to find *deers*' and *sheeps*', instead of *deer's* and *sheep's*, proposed as the form for the possessive plural of these words. This is an unnecessary departure from analogy not taught in the former edition, and is one of the very few instances in which the author unconsciously violates his own principle, that "it is not the province of the grammarian to *legislate* in matters of language, but to classify and arrange its *forms* and principles, by a *careful study of its analogies*, as seen in the *usage of the best writers*." In a note on p. 76, the author says that "relative" pronouns ought to be called "conjunctive" pronouns. This is undoubtedly true; and we only regret that he could not have called them, as Mulligan does, by this truly characteristic name. We hope yet, in a future edition, to see this division of pronouns headed, "Conjunctive (or Relative) Pronouns,"—the old term being inserted in parentheses merely to show the meaning of the other to those not familiar with it,—and the

(1) A GRAMMAR OF THE ENGLISH LANGUAGE. By SAMUEL S. GREENE, A. M. Philadelphia: Cowperthwait & Co.

expression "relative pronoun," thereafter wholly set aside. The author's definition (p. 89), of a regular verb, as "one which forms its past tense and past participle by adding *ed* to the present tense," is a decided improvement upon the common definition, which calls for the addition of "*d* or *ed*,"—a definition which improperly includes "hear, heard," among regular verbs, and excludes from the list such words as "fan, fanned," "mimic, mimicked," "try, tried," etc. The definition might, however, have been improved if, with Covell, the author had added "according to the rules of spelling," instead of leaving this fact to be inferred.

As to Greene's system of Analysis, we have long considered it the best before the public. That system is brought out in this volume with several improved features not found in the old edition, as may easily be seen by a comparison of the two. We notice with pleasure that the book is entirely free from that dogmatic, dictatorial spirit which too often pervades this class of works. As a single exemplification of this, we refer to the treatment of the form "being built," on p. 99.

In point of mechanical execution, the new edition is far superior to the old, the print being exceedingly clear and attractive, on fine and remarkably white paper, and the binding strong and durable.

WE have examined Part II. of Dr. Miller's *Elements of Chemistry*\* with some degree of care, because from the first part we were led to expect a valuable addition to chemical literature. It begins with a discussion of nomenclature, introducing some new terms, and defending the recent division of elements into monads, dyads, triads and tetrads. Instead of applying the term acid to both the hydrous and anhydrous forms, the later method is to term the latter anhydride, and the former acid.  $\text{CO}_2$  is carbonic anhydride, and  $\text{CO}_2, \text{HO}$  is carbonic acid. This is an improvement, for all ox-acids are really salts of hydrogen. The classification of metals differs from that ordinarily accepted, in that it introduces three entirely new groups, "the magnesian metals," magnesium, zinc and cadmium; "metals analogous to iron," cobalt, nickel, uranium, iron, manganese, and chromium; "three metals," copper, lead, and thallium. The bases of the first two groups are sufficiently evident, but why the "three metals," which have no close chemical affinity should be considered together, apart from those with which they have affinity, is not so clear.

The discussion of the non-metallic elements, among which Dr. Miller classes selenium and tellurium, is detailed. It covers two hundred and sixty pages, and speaks of many matters not usually regarded as necessary in a work of this kind. The various combinations of the elements as they occur in nature are described, and methods are given for detecting the presence of gases, as well as for analyzing mixtures of them. In the main process for the discrimination of gases, the author employs Thenard's division into four groups; the arrangement being dependent upon the action of a solution of potash upon them conjoined with the occurrence or absence of combustion upon application of flame to the gas.

The preliminary chapter upon the metals covers sixty pages. The discussion of the metals themselves is full, though we miss any reference to indium. The existence of this metal is sufficiently established, and it has been ob-

(\*) *ELEMENTS OF CHEMISTRY: Theoretical and Practical.* By WM. ALLEN MILLER, M. D., LL.D. Part II.—Inorganic Chemistry. New York: J. Wiley & Son. 8vo. pp. 805. \$7.50.



tained in comparatively large quantities from the zincblende of Freiberg. The omission is therefore unpardonable. Many valuable metallurgical processes are given, and we find some excellent methods of analysis. Chapter 20, is an examination of circumstances which modify the operations of chemical attraction, and is a convenient synopsis of modern investigations. The closing chapter is devoted to modes of determining the combining numbers and atomic weights of elementary bodies.

Though not so exhaustive as Gmelin's, nor yet so much the result of individual research as Graham's, this work must be regarded as the greatest of its class. Without the diffuseness and tedious detail of the former, it is of more extended scope than the latter, and is therefore more useful to the student than either. For exactness of statement, careful examination and breadth of view, it is not excelled by any other treatise. We regret that the author uses the barred symbols, and that in defiance of fact he speaks of the new notation as the "present usual and convenient practice." It is neither usual nor convenient. There is no really prevailing system now; every man employs a system of his own invention. An international congress of chemists must soon be convened, to bring some order out of the wretched chaos termed symbolic notation.

THE use of tables in Chemical Analysis is of doubtful advantage to elementary students, being apt to encourage inaccuracy by rendering detailed study unnecessary. For this reason they are not employed by most American and British instructors, though some German teachers prefer them from the beginning. At Giessen they were introduced by Liebig, and afterwards elaborated by his successor, Will, the friend and co-laborer of Fresenius. Dr. Himes has translated the tables<sup>a</sup> as used by Will. These are very full, and so are less objectionable than those usually appended to text-books of analysis. They are eleven in number, and offer some excellent processes, especially for the detection of acids. If Prof. Johnson ever issues a new edition of Fresenius, he would do well to incorporate Table 6 in the work. This contains by far the simplest and speediest method of separating the substances precipitated by sulphide of ammonium. Practical analysts and advanced students will find these tables exceedingly useful, but we think they should be kept from beginners.

THE same publisher has issued a neat edition of Von Kobell's Mineralogy.<sup>c</sup> This is undoubtedly the best work extant upon determinative mineralogy. Its usefulness is amply attested by its extraordinary success in Germany. The translator has prefixed a brief synopsis of blow-pipe analysis; but it is so vague as to be unserviceable. A considerable portion of this work has already been published in this country, as a part of Elderhorst's Manual.

THE fourth edition of Professor Norton's "Astronomy"<sup>d</sup> has been issued.

- (3) TABLES FOR QUALITATIVE CHEMICAL ANALYSIS. By PROF. HEINRICH WILL. 7th Edition. Translated by C. F. HIMES, Ph. D. 12mo. \$1.25.
- (4) MINERALOGY SIMPLIFIED: A Short Method of Determining and Classifying Minerals. Translated from the German of F. Von Kobell, etc. By DR. HENRI ERNI. Phila.: H. C. Baird. 12mo. pp. 192. \$2.50.
- (5) A TREATISE ON ASTRONOMY. By WM. A. NORTON, M. A., Professor of Civ. Eng. in Yale College. New York: J. Wiley & Son. 8vo. pp. 443 and 115. \$3.50.

The work is in three divisions ; the first, on Spherical Astronomy, describes the movements of the heavenly bodies, and discusses various theories respecting their structure and origin ; the second, on Physical Astronomy, investigates the laws governing their phenomena, and, though brief, is especially thorough. The chapter on Tides is more nearly complete than in any similar work known to us. The third part consists of thirty-one astronomical problems. The more abstract or difficult calculations, of value only to practical astronomers, have been transferred to the appendix, which contains also some valuable excerpts from other works. Ninety-six tables are appended, and several plates, respectably executed, appear by way of illustration. Considerable prominence is given to the author's theories respecting comets, some of which have been confirmed. Having been entirely remodelled, this treatise is better fitted for use in the class-room than before. It is the latest work of its kind, it gives the newer methods of determining latitude and longitude, and of ascertaining the sun's parallax and distance from the earth. Its tables are of unusual extent, and have been compiled with great care. In these respects it is superior to similar works. Though less practical than the treatise by Professor Loomis, it is more available for use as a text-book in colleges, as the author evidently aims at making not thorough astronomers, but intelligent, well-informed men.

WE hazard nothing in saying that, all things considered, no dictionary now before the American public can compare with the so-called Webster of 1864. It is, *par excellence*, "the best." And yet, it is capable of improvement, as all things human are. Even the volume before us\* presents excellencies which the quarto has not.

One of these, and not a trifling one either, or one unworthy of mention, is its size and form. As a volume, it is far more convenient to handle than its bulky and heavy predecessor, being easily grasped and held in a single hand.

Then, as a dictionary for every-day use, whether in the family, the school-room, or the counting-room, it is far preferable, not being cumbered with a multitude of obsolete, or foreign, or technical, or rarely used words, or words for which, like *Philadelphian*, *philosophizer*, *philanthropically*, no definition or pronunciation is needed, and for which probably not one person in ten thousand ever goes or would go to a dictionary. What the generality of people need is not a book crammed with words rarely or never met with in the literature or the ordinary reading of the day, but one for the times, and up to the times. You pick up your Daily in your counting-room, or are reading your Monthly, or your Quarterly, at your fireside. You happen upon a word, for the meaning or pronunciation of which you need to turn to your dictionary. You do not want to waste your time in wandering over an unnecessary list of words to find the one you are in search of. Your time is of value ; and such a volume as this aids you in making the most of it.

In addition to this, the definitions, where they are changed, are briefer and more pointed. Besides, they are put before you in such a shape that the eye takes them in at a glance, and you are enabled to gather their meaning, in very many cases, in less than half the time it would take to

go over them in the quarto. To see what we mean, let any one turn, for example, to *faith*, or *fall*, and compare its definitions as given in the two dictionaries. The superiority of the "National" over the quarto, in the respect referred to, will be seen and felt at once. Where the definitions are cut down or shortened, they are oftentimes decidedly improved thereby. To illustrate:—

"RIVER, n. A stream of water flowing in a channel on land toward the ocean, a lake, or other river; a stream larger than a rivulet or brook."—*Quarto*. "A stream of water, larger than a rivulet or brook, flowing in a channel on land toward the ocean, a lake or other river."—*National*.

"MORPHOLOGY, n. The science which describes the ideal forms of the parts or organs in the structure of plants and animals, treating of their varieties, homologues, and metamorphoses."—*Quarto*. "The science which treats of the ideal forms of the parts or organs in the structure of plants and animals."—*Nat*.

"MOTION, n." Def. "2. Appropriate motion; manner of motion; port; gait; air."—*Quarto*. "2. Appropriate movement; manner of moving; port; gait; air."—*Nat*.

"FERUNCLE, n. A superficial, inflammatory tumor, deep red, hard, circumscribed, acutely tender to the touch, suppurating with a central core; a boil."—*Quarto*. "A superficial, inflammatory tumor; a boil."—*Nat*.

These specimens will give the reader some idea of the changes which the changed definitions of the quarto have undergone. Nor can he fail to see that, for ordinary purposes, these changes have been decidedly for the better. A very large proportion, however, of the original definitions remain unchanged; and among them, some which a slight change would have improved materially. Thus, the noun *cube* is defined to be, "2. The product of a number multiplied twice into itself." A number multiplied twice, whether into itself or into other numbers, gives, not one product, but two;—the same product twice, or else two different products. Thus, 4 multiplied into itself once, gives 16; multiplied again, gives 16; multiplied into itself any number of times, invariably gives 16. But multiplied into its square, it gives 64, the cube of 4.

The pronunciation of several words is more correctly given here than in the quarto. Thus, *abaltoir*, for example, is more correctly marked *abal-tor*, with a triple accent, (the heaviest at the end), instead of a single one, as in the quarto, which would lead a person falsely to infer that the accentuation of this word corresponded with that of *appertain*, or *undertake*.

*Todo*, a corruption of (grea)t *ado*, and used only in the expression, "a great todo," is here spelt, as in Worcester, with a hyphen. It would be better, however, to spell it, as in the quarto, without; or rather, to omit it altogether, or else merely note it under *ado* as a corruption of the same.

The Appendix, 164 pages, besides containing the greater part of the additional vocabularies and tables of the quarto, possesses three new features. 1. A glossary of Scottish words and phrases. 2. A vocabulary of English rhymes. 3. A concise mythological dictionary. These very greatly enhanced the value and usefulness of the work. To many, they alone would be worth the cost of the entire volume; which, after all, is but half that of the quarto.

As for the type, it is exceedingly sharp and clear, presenting a most

attractive page, excelling in appearance even that of the quarto edition. In short, the book is really a gem of a dictionary, just the thing for the million; and we predict that, as it becomes known, it must meet with an extensive sale and a hearty welcome among all classes.

PROF. N. A. NEWTON, of Yale, one of the most influential in securing the adoption by the general government of the new system of weights and measures, has prepared a chapter on the subject to accompany Eaton's *Arithmetic*. He has given the *Metric System*<sup>7</sup> in its simplicity, without attempting to improve it by making it twice as complex as the want of system it is to supersede. The examples for practice are few, but comprehensive; the writer's aim evidently being to illustrate each division of arithmetic by at least one characteristic problem.

A New Edition of *Watson's Hand-Book of Calisthenics and Gymnastics*<sup>8</sup> has lately been published. Of the merit of the work it is not necessary to speak. The popular verdict placed that beyond question long ago. The present edition is in every way equal in paper and printing to the last, and much neater in style of binding.

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## SCIENCE AND THE ARTS.

MR. BALFOUR STEWART, in a lecture before the Royal Institution, London, on the sun as a variable star, expressed the opinion that the spots on the sun's surface are produced by the downward currents of the surrounding atmosphere, the depth of which had been estimated at not less than seventy-two thousand miles. A downward rush of atmosphere occasions an exposure of the body of the sun, and produces an appearance of a dark spot; an upward rush of the atmosphere produces the bright *feculæ* that surround the dark spots, and are seen more conspicuously on the border of the sun's disc. This atmosphere, he believes to be very sensitive to the approach of the planets, especially of Venus, in consequence of its comparatively short distance, and of Jupiter, in consequence of its size. When Venus is opposite to the earth, the spots attain their maximum, which is sometimes as much as fifteen thousand miles in diameter. From these spots we estimate that the sun rotates on its axis once in about twenty-five days; but there is reason to believe that the spots rotate faster than the body of the sun, owing to the more rapid motion of the upper portion of the atmosphere, which, on being carried nearer to the center by a downward current, retains the velocity it before possessed, in the same manner as the trade winds on the earth are supposed to be caused by the different velocities of the air near the poles and in the equatorial regions. In addition to the influencing causes attributable to the movements of the planets, there are periodical variations of the spots occurring about every ten years, which cannot be accounted for. The

(7) *THE METRIC SYSTEM.* By Prof. N. A. NEWTON. Boston: Taggard & Thompson.

(8) *WATSON'S HAND-BOOK OF CALISTHENICS AND GYMNASTICS.* By J. MADISON WATSON. New York: J. W. Schermerhorn & Co. \$2.

lecturer attributed the corona observed during the last total eclipse of the sun, to the atmosphere, and it is on calculations founded on those appearances, that the height of the sun's atmosphere has been conjectured.

—BERTHELOT has suggested a new theory of the origin of petroleum. Acetylides are always formed when carbonic acid comes in contact with the alkaline metals at a high temperature. The earth is everywhere impregnated with carbonic acid, and Daubree has recently shown good reason for believing that the terrestrial mass contains melted alkaline metals in the interior. From the acetylides thus supposed to be formed, bitumen and tars are produced by the perpetual reaction of hydrogen. At one of the stages these reactions are capable of producing a series like the American petroleum.

—A German chemist has discovered that, if glue or gelatine be mixed with about one-fourth of its own weight of glycerine, it loses its brittleness, and becomes applicable for many purposes for which it is otherwise unfit. M. Puscher uses mixtures of this kind for dressing leather, preparing artificial bones, for giving elasticity to parchment and porcelain, or enamelled paper, and for book-binding. A cement composed of starch, glycerine, and sulphate of lime is said to remain plastic and adhesive, and is recommended for luting chemical and philosophical apparatus, and other similar purposes. Glycerine glue is said to possess many of the qualities of india rubber, and particularly that of erasing the marks of blacklead pencils. If wax be added to a mixture of gelatine and glycerine, and zinc yellow used as a ground for the application of aniline red, the color produced is said to be brilliant in the extreme.

—NEARLY all tin foil now used is adulterated with lead. Common tin foil contains 86.92 per cent. of lead; embossed foil, 76.57 per cent.; tea foil, 88.66 per cent., and the so-called pure tin foil, 32.62 per cent. of lead. The adulterated article is made by placing an ingot of lead between two ingots of tin, and rolling them into sheets which have a coating of tin on both sides.

—FRIEDE and Ladenburg have prepared a body containing one atom of hydrogen, one of silicon, and three atoms of chlorine. It boils between  $34^{\circ}$  and  $37^{\circ}$  5 C., the vapor of which, mixed with air, explodes on contact with an ignited body. The gas is not spontaneously inflammable at ordinary temperature.

—A species of nettle, which grows luxuriantly and spontaneously in the Mississippi valley, is now employed in the manufacture of cord, cloth, bagging and paper. The stalks, which grow from four to eight feet high, are gathered in the winter, and are ready for the brake without any wetting process. The fiber is fine, strong, and susceptible of a high finish by dressing.

—When a little lead is melted with iron it rises and floats on the surface of the iron in the shape of small spheres. These, however, are not solid; they are hollow vesicles with only thin walls of lead. The supposition is that at the temperature of fused iron, lead is vaporized, and condenses in the vesicular state as water does to form rain-clouds. The phenomenon resembles, too, the spheroidal condition which water assumes on a red-hot metal plate.

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have been but little better or more available than the explorer's compass. But with the Globe Time Piece,\* or Geographical Clock, the whole matter is made so simple and apparent that a child even can study it out by himself. Place the clock in the school room, and from their own observation pupils will become familiar with the grand outlines of Mathematical Geography long before the age at which children are put to such studies.

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\* TIMBY'S GLOBE TIME PIECE. Manufactured by J. W. Schermerhorn & Co., 430 Broome Street, New York. Price \$25.



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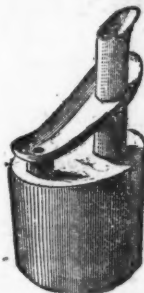
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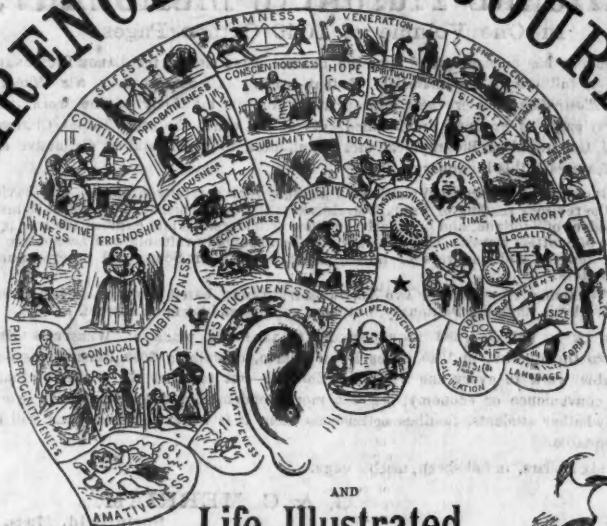
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